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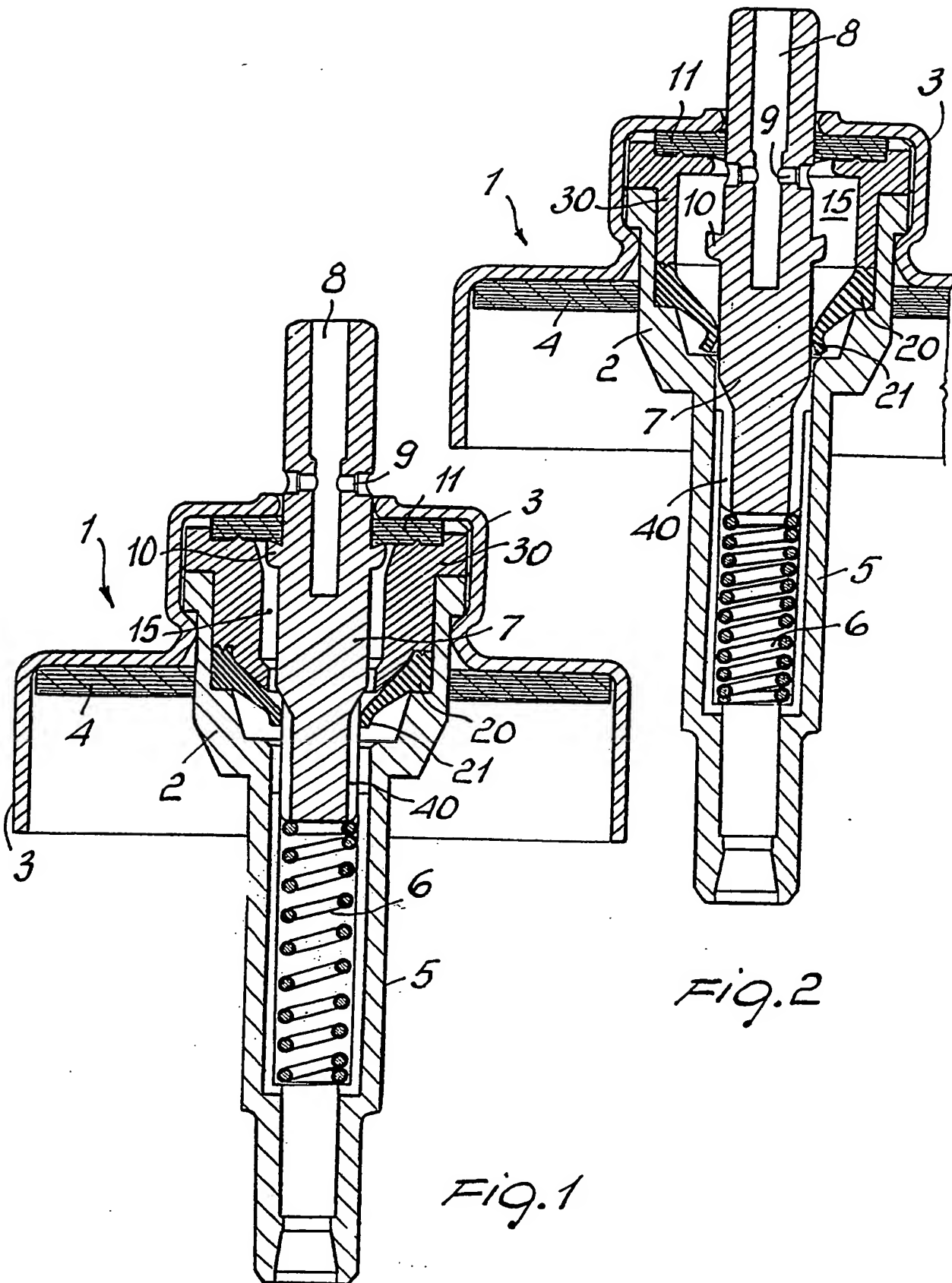
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## SPECIFICATION

### Metering valve for dispensing pressurized liquids

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This invention relates to a metering valve for dispensing pressurized liquids, particularly for use with containers of the so-called spray-can type.

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Currently available on the market are metering valves for spray-cans, which are so constructed as to allow a pre-proportioned amount of the product to be dispensed at each actuation of the valve control pushbutton.

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Such valves, in one known form thereof, comprise essentially a bowl element which is associated in sealed relationship with the mouth of the container or can by means of a folded seam collar. Within said bowl element, there is axially slidable, against the bias of an elastic means, a valve stem.

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Inside the bowl element, there is further provided a cylindrical portion, generally formed from an elastically deformable material, which defines along the bottom portion thereof a lip type of seal adapted for engagement with the valve stem, in contact relationship therewith, when said stem is in its dispensing position. More specifically, the stem can be actuated to selectively put the metering chamber defined between said stem and the cylindrical body, into alternative communication with the outside, and hence in a dispensing condition, or with the inside of the container or can.

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With the latter approach, it happens that, where the useful volume of the metering chamber is to be changed, i.e. when it is desired to change the amount of product dispensed at each actuation, the cylindrical body must be replaced as a whole, along with the bowl element and the collar which secures it to the container.

It will be appreciated, therefore, how in order to change the dispensed proportions the majority of the metering valve components have to be replaced with others having different dimensions; thus to accommodate the wide range of proportions required, the manufacturer is obliged to store high quantities of different size components, which creates a problem both as regards the inventory and the production thereof.

This invention sets out to eliminate such past drawbacks by providing a metering valve so designed and constructed as to allow the useful volume of the metering chamber to be changed without involving alteration of a high number of components, and requiring in practice the availability of but a number of standard elements which do not require to be modified to suit the volume of the metering chamber to be preset, and of a single interchangeable element for accommodating div-

erse contingent requirements.

Within the above general aim, it can be arranged that the inventive metering valve for dispensing pressurized liquids, additionally to having a greatly simplified construction, is also highly reliable and safe to use.

It is further possible to arrange that the metering valve of this invention, while enabling a significant rationalization of its various manufacturing steps, can also bring about appreciable advantages from the standpoint of production costs.

According to one aspect of the present invention, there is provided a metering valve for dispensing pressurized liquids which comprises a bowl element sealingly associable with the mouth of a container and carrying, axially slidable therein, a valve stem operable to selectively put into communication with the interior and exterior of said container a metering chamber defined between said valve stem and a substantially cylindrical body accommodated in said bowl element, and characterized in that said substantially cylindrical body comprises a lower portion adapted for contact engagement with said valve stem to shut off the communication between said metering chamber and said container, with said stem in the dispensing position thereof, and an upper body as sociable with said lower portion and being interchangeable for determining the useful volume of said metering chamber.

Further features and advantages will become more openly apparent from the following description of a preferred, but not limitative, embodiment of a metering valve for dispensing pressurized liquids according to this invention, with reference to the accompanying exemplary drawing, where:

*Figure 1* shows schematically an axial section through a metering valve in the closed position, with the upper body determining the minimum volume for the metering chamber; and

*Figure 2* illustrates the metering valve with the valve stem in the dispensing position, and with the upper body determining the maximum useful volume for the metering chamber.

With reference to the drawing figures, the metering valve for dispensing pressurized liquids, according to the invention, is generally indicated at 1 and comprises a bowl element 2, which can be associated with the mouth of a container by means of a small hood 3 fold-seamed to the container with the interposition of a sealing gasket 4.

From the lower or bottom portion of the bowl element 2, there depends axially a hollow spigot 5, open at the bottom and communicating with the container interior, which accommodates, for sliding movement against the bias of an elastic means including a spring 6, the lower portion of a valve stem 7 the upper end whereof protrudes out of the hood

3 and is formed with an axial recess 8 having at least one radial hole 9 which, in the inoperative position, is positioned on the exterior of the hood 3, and, in the operative or dispensing position, as determined by the downward translation of the stem 7 against the bias of the spring 6, puts the metering chamber, as defined inside the bowl 2, in communication with the outside.

More in detail, the stem 7 is provided with an annular embossment 10 which, with the stem in the upper position, abuts against an upper gasket 11 to sealingly separate the interior of the container from the outside environment.

A peculiar characteristic of the invention resides in that between the bowl element 2 and stem 7 there intervenes a cylindrical body, effective to determine the volume of the metering chamber, which comprises a lower portion 20, made of an elastically deformable material, which has a lipped frusto-conical taper 21 and is adapted for engagement with the body of the valve stem 7 to provide a fluid-tight seal between the metering chamber, indicated at 15, and the interior of the container when the stem 7 is in its dispensing position.

The cited cylindrical body includes an upper body 30 of an interchangeable type, which can be connected to the upper edge of the lower portion 20 and is held pressed on the bowl element 2 by the hood 3.

The cited upper body is, as evidenced in the drawing, readily interchangeable to vary the useful volume of the metering chamber 15 by simply changing a single element, represented indeed by the upper body 30, and leaving unaltered all the other components of the metering valve.

It should be added that, to facilitate the coupling together of the lower portion 20 and upper body 30, male and female connectors may be respectively provided at the mating areas between the lower portion and upper body 30.

For a more complete description, it should be further added that the lower portion of the stem 7 is preferably provided with ribs 40, wherewith there engages in contact relationship the taper 21 of the lower portion 20, with the valve in the inoperative or non-dispensing position, enabling the communication between the metering chamber and the interior of the container, to thus ensure that the product within the container always fills the metering chamber.

The operation of this metering valve is similar to that of conventional valves. In fact, with the stem 7 in its upper position (Fig. 1), the metering chamber 15 is in communication with the container interior, and consequently the product will flow into the chamber. By manipulating the stem 7, with a depressing action which overcomes the elastic bias of the

spring 6, the stem is moved downwards to engage with its solid portion the gasket 21, thus shutting off the communication between the metering chamber and the container interior, while at the same time communicating with the metering chamber the radial holes 9 which allow the product to be dispensed out through the axial recess or seat 8.

It will be appreciated from the foregoing description that the invention achieves its objects, and the fact should be pointed out that, by providing the cylindrical body which determines the volume of the metering chamber with two separated elements, only one of which requires replacement to change the metering volume, the construction of the valve is considerably simplified, and the advantage is afforded to the manufacturer of the valve of having but a single element, consisting of the upper body 30, to replace in order to provide the diverse proportions demanded by the market.

The fact should also be mentioned that it would be possible, in principle, to provide the cylindrical body in one piece, but in this case, when reduced volume metering chambers are to be provided, the cylindrical portion would have to be made with a considerable thickness, which results in a significant cost increase owing to the necessary utilization of comparatively valuable materials, at least for the area which provides the seal between the stem and cylindrical body. Accordingly, the solution adopted of a cylindrical body in two pieces affords the possibility of making the sealing part from a valuable material, and the part for practically adjusting the volume from a material of substantially lower cost.

The invention as described is susceptible to many modifications and variations, all of which fall within the scope of the inventive concept.

Moreover, all of the details may be replaced with other technically equivalent elements.

In practicing the invention, the materials used, on condition that they are compatible with the intended application, and the dimensions and contingent shapes, may be any ones according on individual requirements.

## CLAIMS

1. A metering valve for dispensing pressurized liquids, which comprises a bowl element sealingly associable with the mouth of a container and carrying, axially slidable therein, a valve stem operable to selectively put into communication with the interior and exterior of said container a metering chamber defined between said valve stem and a substantially cylindrical body accommodated in said bowl element, and characterized in that said substantially cylindrical body comprises a lower portion for contact engagement with said valve stem to shut off the communication between said metering chamber and said con-

tainer, with said stem in the dispensing position thereof, and an upper body associable with said lower portion and being interchangeable for determining the useful volume of  
5 said metering chamber.

2. A metering valve for dispensing pressurized liquids according to Claim 1, characterized in that it comprises connector means at the mating area between said upper body  
-10 and said lower portion.

3. A metering valve for dispensing pressurized liquids, substantially as herein described with reference to the accompanying drawing.

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